

AMENDMENTS**In the Claims****Current Status of Claims**

- 1.(canceled)
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- 1 14.(previously presented) The method claim 18, wherein an order of the positive ramps and the
2 negative ramps are designed to achieve a desired separation efficiency.

- 15.(canceled)
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- 1 18.(currently amended) A method for improving separation efficiencies comprising the step
2 of:
3 providing a gas chromatography (GC) apparatus comprising:
4 a microwave oven adapted to heat the GC column and including:
5 a GC column having:
6 a continuous phase material forming a wall surrounding an interior
7 space for containing a chromatography sample and
8 a microwave absorbing material contained in the continuous phase
9 material,
10 a microwave source,
11 a temperature sensor, and

12 a microwave source controller adapted to control a microwave power to the
13 microwave oven ~~by~~ by the microwave source and to control a power
14 efficiency of the microwave source,
15 a coolant source, and
16 a coolant source controller adapted to control a flow rate of the coolant, and
17 performing one or a first plurality of positive temperature ramps, where each positive
18 temperature ramp comprises raising a current temperature of the GC column from a lower start
19 temperature or a first plurality of lower start temperatures to a higher stop temperature or a first
20 plurality of higher stop temperatures at a positive controlled rate or at a first plurality of controlled
21 rates, and
22 performing one or a second plurality of negative temperature ramps, where each negative
23 temperature ramp comprises lowering a current temperature of the GC column from a higher start
24 temperature or a second plurality of higher start temperatures to a lower stop temperature or a
25 second plurality of lower stop temperatures at a negative controlled rate or at a second plurality of
26 controlled rates,
27 where the negative temperature ramp improves the separation of lower boiling components
28 from higher boiling components or the improve the separation of components having boiling points
29 within a narrow temperature range.

1 19.(previously presented) The method of claim 18, further comprising the steps of:
2 holding the GC column at each higher stop temperature for a positive ramp hold time and
3 at each lower stop temperature for a negative ramp hold time by supplying a coolant to the GC
4 column and irradiating the GC column with microwave energy under temperature maintaining
5 conditions.

1 20.(previously presented) The method of claim 19, wherein the under temperature maintaining
2 conditions comprises a coolant flow rate at a given coolant temperature coupled with microwave
3 heating under computer control to maintain the GC column at each hold temperature.

1 21.(previously presented) The method of claim 18, wherein at least one lower stop temperature
2 is a subambient temperature.

1 22.(previously presented) The method of claim 18, wherein the coolant is nitrogen and the
2 coolant supply is a liquid nitrogen tank.

1 23.(previously presented) The method of claim 18, wherein the narrow temperature range is
2 10°C or less, each hold time is from about 0 minutes to about 30 minutes, and each positive or
3 negative temperature ramp comprises a heating rate or cooling rate between about 1°C/minutes and
4 about 300°C/minute.

1 24.(previously presented) The method of claim 18, wherein the narrow temperature range is
2 10°C or less, each hold time is from about 0.1 minutes to about 20 minutes, and each positive or
3 negative temperature ramp comprises a heating rate or cooling rate between about 1°C/minutes and
4 about 200°C/minute.

1 25.(previously presented) The method of claim 18, wherein the narrow temperature range is
2 10°C or less, each hold time is from about 0.5 minutes to about 10 minutes, and each positive or
3 negative temperature ramp comprises a heating rate or cooling rate between about 1°C/minutes and
4 about 150°C/minute.

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